sill. He carefully removed part of the waxen covering of one of the little groups of larvæ, inserted a grub taken fresh from a hive, and covered the whole again roughly, "expecting that the bees would complete the repairs, and so seal up the intruder with the others. But they were not to be cheated in this way, and they would not repair the broken wax until they had smelt out the stranger, whom they dragged out and carried outside the nest, after which they replaced the breach in the usual way." He made the experiment several times, but with no better success. He then placed some hive-bee eggs among a little group just deposited by the humble-bee queen. The bees seemed to be rather puzzled. "One or two of them took them up somewhat aimlessly, and again replaced them as if they hardly liked to openly accuse their sovereign of misconduct, which they seemed to suspect." After some hesitation they proceeded, apparently with considerable relish, to eat the eggs. "So appreciative did they become of the flavour of these new-laid eggs that they would soon accept them readily when I offered them at the end of a needle."

Observations on a captive queen humble-bee supplied with an empty nest were also interesting. She spent several days beating against the window-pane and then gave it up entirely; she showed great interest in brightly coloured objects like brass handles, gilt labels on books, and waistcoat buttons. But she was particularly intrigued by the keyhole of the door, into which she would try to squeeze herself. Apparently it "suggested" the opening into an underground nest.

In the essay on hares there is an interesting paragraph. "It is a moot question whether the hare is a rabbit which has taken to the open or the rabbit a degenerate hare which has obtained comparative safety by taking to a stupid life in the earth. It is an interesting fact in this connexion, and one not often remarked on by observers, that a hare, if it finds an obstacle it wishes to get rid of, will naturally scratch with its front legs with considerable strength and with exactly the same movement as a rabbit. Thus, although the hare lives in the open grass country, never takes to earth, and much dislikes ground infested by rabbits, it has to all appearance latent in its muscles the beginning of an instinct which might be developed into the rabbit's capacity for burrowing."

Of its kind the picture of a midsummer night is difficult to beat; it is as well drawn as Richard Jefferies could have done it. Take the sounds: the churr of the night-jar, calling to his mate; the undertone of the hundred rills and the swollen river; the warning stamp of rabbits that have been disturbed in their feeding; the strident love-note of the corncrake; the shrill cry of the partridge; the nightingale singing to his mate on her nest; and then the larks, the thrushes, the twittering swallows as the fringes of the night overlap the coming day. It is not merely a well-drawn picture; it is a reflective appreciation.

What Mr. Kidd has to say about animal behaviour is always interesting. Obeying the law of parsimony he will press the simplest re-description as far as it will go, and yet he cautions us that "the more the subject is closely studied the less the observer finds himself inclined to accept ready explanations." A young sheldrake, fed on dry ground, went through a kind of dancing or prancing movement, stamping rapidly on the floor with its feet. Darwin connected this with the sheldrake's habit of patting the sand or mud near the worm-burrows on the seashore flats. The stamping is supposed to "make the worm come to the surface," and so the sheldrake keeps on stamping. But Mr. Kidd points out that it is the way of young wild duck in general to stand in the shallow water and stamp gently and rapidly on the muddy bottom. This makes an eddy bringing up food-particles which are then seized and devoured. Three-days-old ducklings, hatched under a domestic hen, exhibit the movements to perfection. Perhaps the sheldrake's stamping is merely a slight modification of a piece of instinctive behaviour general among ducks. But in the opposite direction, Mr. Kidd makes out a good case for refraining from any simplicist interpretation of the behaviour of a collie dog. We fail utterly unless we take into account its ancestry, for it was one of a pack, a social unit. "The dog has probably still some sort of conception of his place as member of a co-operative group, and of his master as the wise and resourceful leader of it." The other essays discuss sea-trout, eels, frogs, birds, squirrels, and the like. All are illuminating and all are delightful.

Metallography in the Workshop.

Steel Thermal Treatment. By J. W. Urquhart. Pp. xv + 336. (London: Crosby Lockwood and Son, 1922.) 35*s.* net.

NEARLY all the books which have hitherto been written on the heat treatment of steels are the work of metallurgists. The interesting thing about the present work is that it has been written by a man engaged in the production of machinery and various steel components and tools in his workshops in Leicester. As he states, he has been forced to put into practical use all the recently introduced processes employed in

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the heat treatment of steel. Many other tool makers have been in the same position. It has, however, been left to Mr. Urquhart, not merely to make a study of the processes involved, but to write a book on them from a practical engineering view-point. In doing this he has rendered a service to his brother engineers which they will probably not be long in recognising, for he has written his book in language which is as free from technicalities as possible.

The time has gone by when steels as received from the makers were forthwith worked into machines, without any preliminary treatment, and when it was not realised that a thermal process could add enormously to their physical strength and effectiveness. In consequence there has been a revolution in the engine and machine building trades within the last few years, which is only realised by the men engaged in those trades. As the author points out, not only have great improvements been introduced in the treatment of well-established carbon steels, but they have been followed by a remarkable development in the use and heat treatment of alloy steels. These advances have necessitated the application of better systems of applying heat and measuring the temperatures produced, and these in their turn have led to the introduction and development of electrical methods of heating, which are capable of a higher degree of control and accuracy.

The early chapters of the book deal with the recent developments in metallography as applied to steels. The author has mastered the theory of the iron-carbon equilibrium, as applied to both carbon and alloy steels, and this is one of the best parts of the whole book. As he points out, one of the most remarkable effects of alloying nickel with mild steel is the lowering of the temperature of the Ac1 range, an effect which means diminished cost of working the steel, a greater margin of safety against over-heating, increased ductility, toughness, and resilience in the finished product. The physical characteristics of steels and testing methods are next described, and these are followed by an outline of thermal processes. Chapters on furnaces and their methods of working come next, and a very good account is given of pyrometers and their application to the thermal treatment of steels. Methods of case-hardening, both by solid and gaseous reagents, are next described, and these are followed by details of the various methods of quenching. Later chapters deal with various types of tools and typical heat treatments, and in the last two chapters accounts are given of the thermal treatment of high-speed tool steels and stainless steels.

To some extent the book is an attempt to co-ordinate the work of the laboratory with that of the engineer's hardening department; and with this end in view, the author has included a series of photomicrographs illustrating the structures of steels at various stages of heat treatment under workshop conditions. He has availed himself of the experience of well-known metallurgists, such as M. Guillet and the late Prof. Howe on the academic side, and of Sir Robert Hadfield, Mr. S. Brayshaw, and Prof. Giolitti on the practical side. There is no doubt that the volume will be widely welcomed by practical men, and it should do much to raise the standard of the scientific heat treatment of tools and machine parts. H. C. H. C.

Mosquito Control.

Mosquito Eradication. By W. E. Hardenburg. Pp. ix+248. (New York and London: McGraw-Hill Book Co., Inc., 1922.) 15*s.*

IN this small book the author gives a clear and concise account of the measures which have been found successful in controlling mosquitoes in America. The brilliant results of the anti-mosquito work in Havana and the Isthmus of Panama have been fully appreciated in the United States. Dr. G. A. Le Prince, formerly Chief Sanitary Inspector, Isthmian Canal Commission, wrote, in the Annual Report, U.S. Public Health Service for 1920, "The public view-point has changed; villages, towns, county and state officials, as well as business corporations and railroads, now realise the extent of the large preventable financial loss they incur each year. . . . The people have been watching the campaigns undertaken, and throughout the country they are becoming more and more interested in having their own community and state undertake this work. . . . This calendar year, 101 places are doing work under the supervision of the Public Health Service, and have already appropriated $280,000 therefor."

The modern methods of mosquito control are merely elaborations of those originated by Sir Ronald Ross in the East and by General Gorgas in the Canal zone and Cuba; they have already been described very graphically by Le Prince and Orenstein. But Mr. Hardenburg, who is a sanitary engineer, has treated the subject from a somewhat different point of view from that adopted in "Mosquito Control in Panama." Descriptions are given of the more important American culicine and anopheline mosquitoes. These, though brief, are sufficient to enable a sanitary officer to recognise most of these insects that he is likely to meet with; the information given in the body of the book is supplemented, in an appendix, by a more technical key for the identification of both larvæ and adults.

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